Agilent U4998A
HDMI 1.4a Protocol Capture and Generation Compliance

Data Sheet

INTRODUCTION

Product description

The Agilent U4998A AXIe-based module for HDMI protocol/audio/video capture and generation compliance supports all video formats, including 3D and deep color, up to the maximum data rate of 3.4 Gbps. The module's wide range of capabilities enable you to test legal codes, basic protocol, packet type, pixel encoding, video format timing, AVI Infoframe, ACR, audio sample packet jitter, deep color, 3D video format, and more.

Applications

- HDMI Authorized Test Centers
- HDMI chip developers
- Consumer products incorporating HDMI (e.g. – DVD player/recorder, Blu Ray player/recorder, Game console, PCs and peripherals, TVs, Displays, Mobile phones, AV Receiver, etc.)

Features

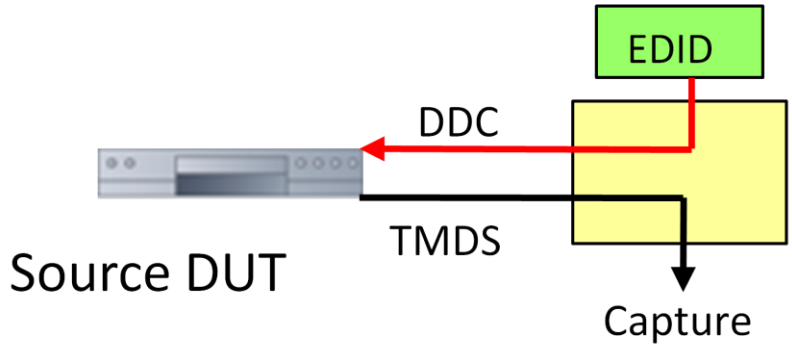
- User-controlled execution of individual or multiple HDMI 1.4a protocol/audio/video compliance tests
- Maximum data rate of 3.4 Gbps to cover all video formats, including 3D, 4kx2k and deep color
- Clear indication of test PASS/FAIL results. View the results in the application or save it to an offline text file.
- Multiple measurement modes – capture/compliance and generate/compliance are standard, passive monitoring mode with pass through and mirror capabilities is optional
- 3D support in both capture and generation
- Support for deep color (30-bit, 36-bit, and 48-bit)
- HPD (Hot Plug Detect reset) reset eliminates the need to remove and connect the HDMI cable between tests
- Internal frequency counter eliminates the need for external equipment
- 4 GB deep memory allows you to capture the minimum sample time of 2 seconds

Customer values

- Have confidence in obtaining CTS certification on the first pass by performing in-house testing with the same equipment used by ATCs.
- Test the complete range of video formats, including 4kx2k and 30-bit, 36-bit, and 48-bit deep color supported by the U4998A's maximum data rate of 3.4 Gbps.
- Generate patterns beyond those defined by the CTS with BitifEye's frame generator application.
- Perform deeper analysis and identify the root cause of failures with the N5998U-DBG option.
- Automate your HDMI testing and remotely control the U4998A using the COM server embedded in the application software.

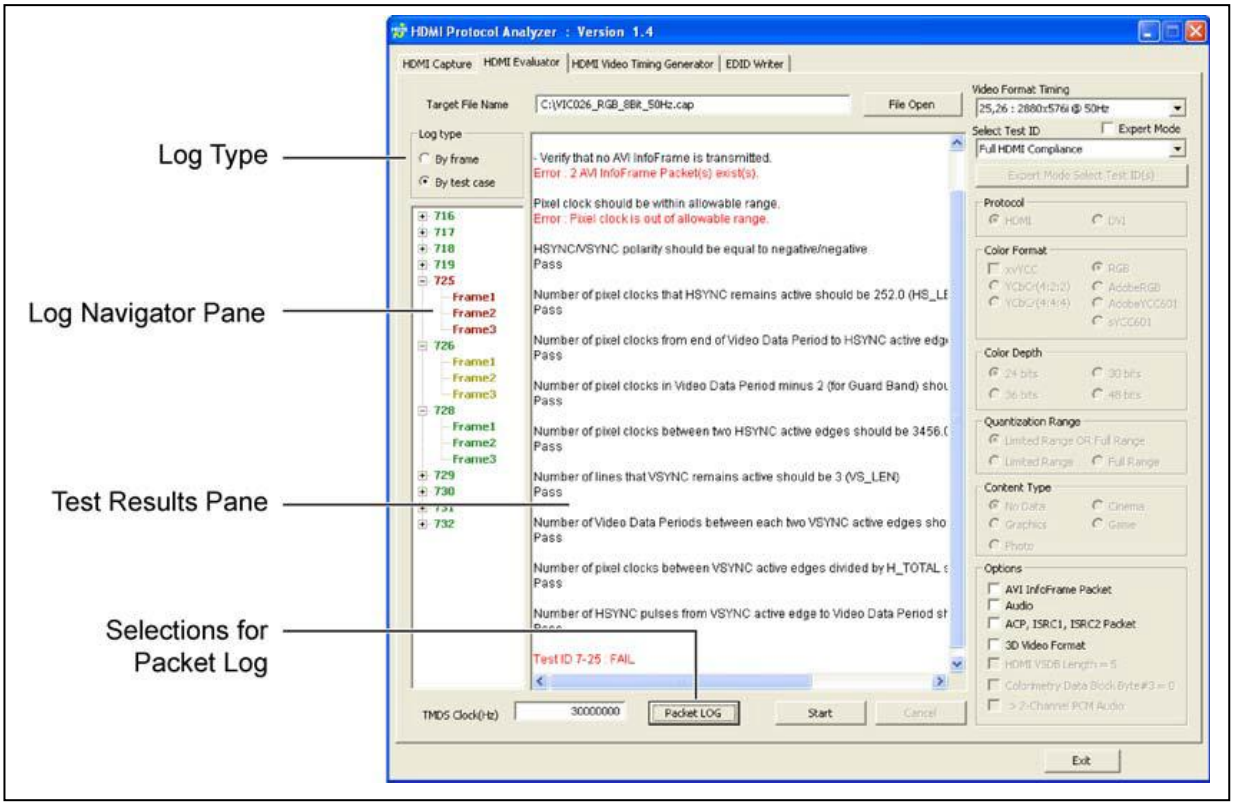
Operating Modes

Capture/Compliance for Source Testing



Source DUT reads U4998A's EDID

The U4998A supports the source compliance tests for Section 7.4 – Protocol, Section 7.5 – Video, Section 7.6 – Audio, Section 7.7 – DVI, and Section 7.8 – Advanced Features of the HDMI 1.4a CTS. The module captures up to 4 GB of data. The data is transferred to the host PC and post processed by the HDMI Evaluator software. The Packet Log results pane indicates the PASS/FAIL status along with information about the cause of the failure.



The CTS source audio tests require a minimum sample time of 2 seconds. You can determine the minimum file size to meet this requirement for each primary video format using the formulas below. Note one pixel is 64 bits (8 bytes) in the target file.

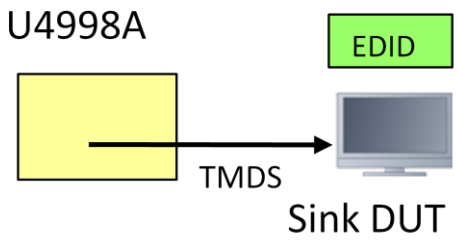
Calculating the file size for the 2 second CTS requirement

- Progressive formats: 2 sec frame size = (H total x V total x 8) x V Freq x 2
- Interlaced formats: 2 sec frame size = (H total x V total x 8) x V Freq x 2
- The H total, V total and V Freq values are listed in the Video Format Timings 2 of the CEA-861-C CEA Standard.
- For 30 bit color multiply by 1.25, for 36 bit deep color multiply by 1.5

Example for 720x480p 60 Hz:
File size = 858 x 525 x 8 x 60 x 2
= 432,432,000 Bytes

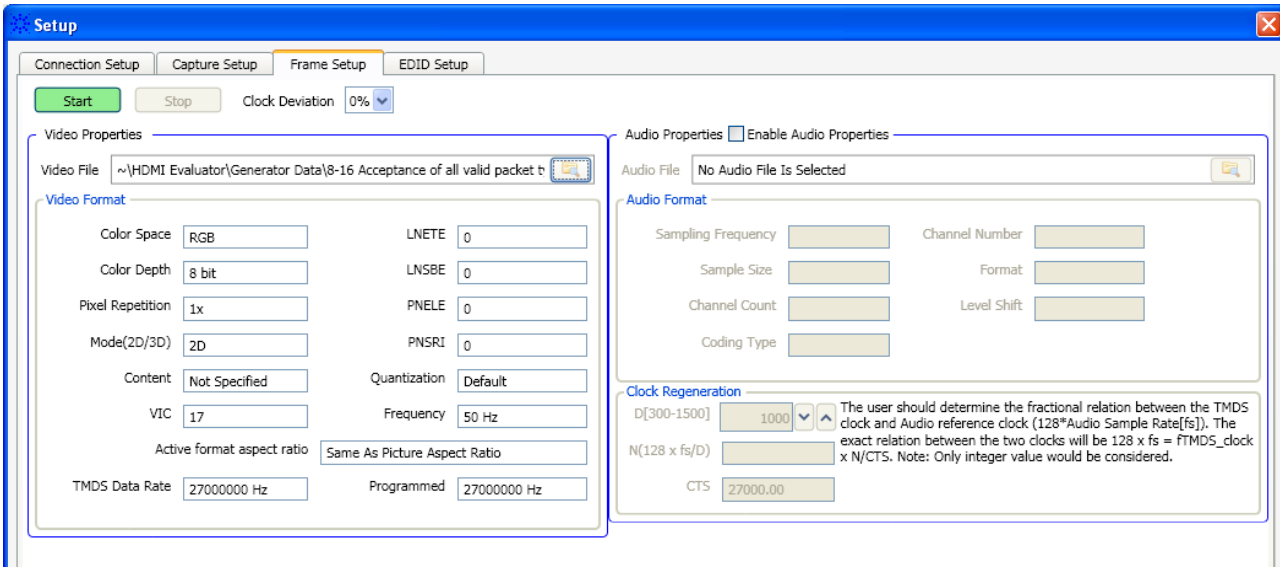
A 10% margin is recommended because the data file typically doesn't start exactly at the beginning of a frame. Hence a 480 MB file size is required for testing 2 seconds of 720x480p 60 Hz audio data.

Generate/Compliance for Sink Testing



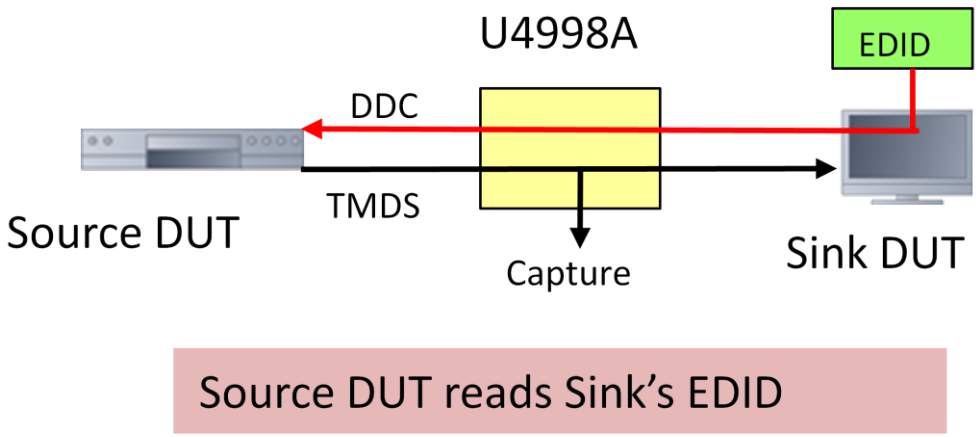
No EDID communication
(U4998A doesn't read EDID of Sink)

The U4998A HDMI software includes the predefined test patterns required for CTS sink tests 8-16, 8-21, 8-23, 8-29, 8-31 and, in conjunction with the Agilent TMDS signal generator E4887A, 8-25. The software provides the ability to generate protocol and audio patterns, including deep color patterns. Simply load any of the predefined files and press Start to send the desired test pattern to your sink device.



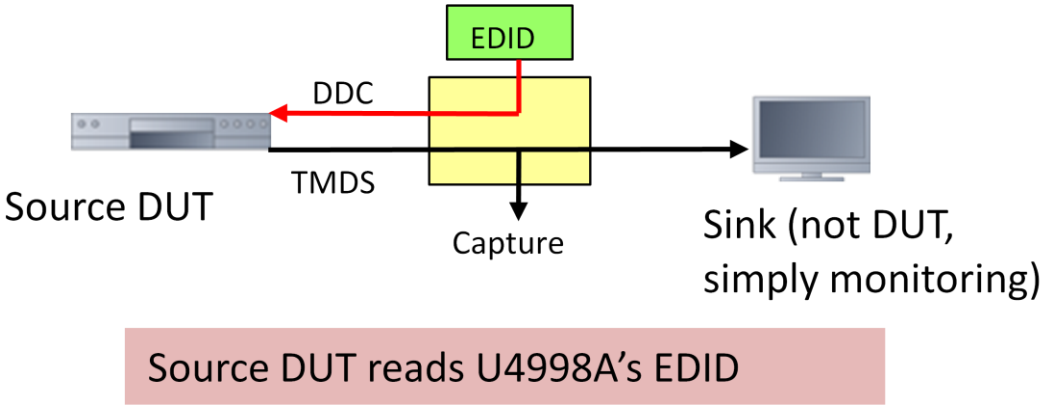
If you need to generate additional patterns beyond those defined by the CTS, Agilent, in partnership with BitifEye, provides a frame generator application. The frame generator (BIT-HDMI-FG-PAG), allows you to define the patterns to generate and automatically sends it out through the U4998A PAG.

Passive Monitoring – Pass through mode



The optional Passive Monitoring mode provides two ways to monitor the output of a source device – either pass through or mirror. Pass through mode uses the EDID from the sink DUT. The U4998A effectively snoops the TMDS signals between the source and sink, enabling you to debug and troubleshoot source and sink issues.

Passive Monitoring – Mirror mode



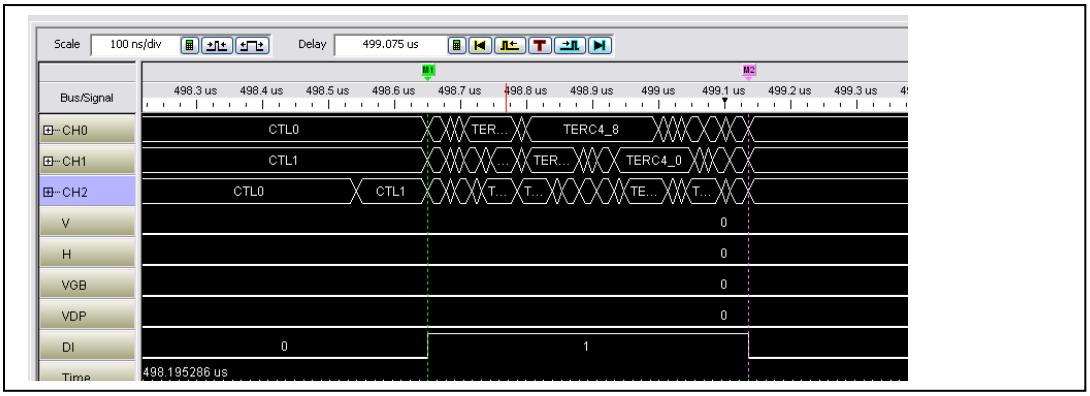
The mirror mode portion of the Passive Monitoring option allows you to capture data activity exactly like Capture mode. In addition, an external sink device shows the input signal from the source DUT. Some DUTs have only HDMI output while others change the status of the video output when the HDMI cable is disconnected. Mirror mode is very helpful for monitoring activity from these types of DUTs.

Automated Testing and Remote Operation

Do you need to spend your time implementing solutions versus sitting in front of the instrument running tests? Automate your HDMI testing and remotely control the U4998A using COM commands. The COM Server is embedded in the application software.

Optional Debug Software

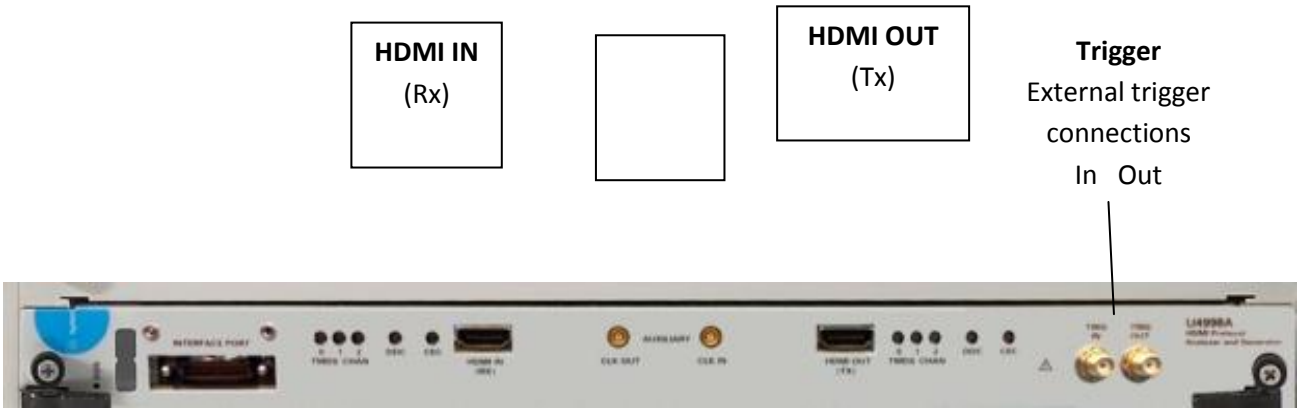
With the N5998U-DBG option, you can import captured data into an offline waveform viewer to identify the cause of test failures. The waveform view clearly highlights the relationship between the different signals and allows for easy navigation through markers and zoom-in/zoom-out capabilities. As an example, this capability could be used for data island period debugging.



umber	CH0	CH1	CH2	V	H	VGB	VDP	DI	Time
37022	11 0101 0100	00 1010 1011	CTL1	0	0	0	0	0	498.612794 us
37023	10 1000 1110	01 0011 0011	Data Island	0	0	0	0	1	498.626262 us
37024	10 1000 1110	01 0011 0011	Data Island	0	0	0	0	1	498.639730 us
37025	10 1001 1100	10 1001 1100	TERC4_0	0	0	0	0	1	498.653198 us
37026	10 1000 1110	10 0110 0011	TERC4_1	0	0	0	0	1	498.666666 us
37027	10 1100 1100	10 1001 1100	TERC4_1	0	0	0	0	1	498.680134 us
37028	10 1100 1100	10 1001 1100	TERC4_0	0	0	0	0	1	498.693602 us
37029	10 1100 1100	10 0110 0011	TERC4_1	0	0	0	0	1	498.707070 us
37030	10 1100 1100	10 1001 1100	TERC4_1	0	0	0	0	1	498.720538 us
37031	10 1100 1100	10 1001 1100	TERC4_1	0	0	0	0	1	498.734006 us
37032	10 1100 1100	10 1001 1100	TERC4_1	0	0	0	0	1	498.747474 us
37033	10 1000 1110	10 0110 0011	TERC4_0	0	0	0	0	1	498.760942 us
37034	10 1100 1100	10 1001 1100	TERC4_0	0	0	0	0	1	498.774410 us
37035	10 1100 1100	10 1001 1100	TERC4_0	0	0	0	0	1	498.787878 us
37036	10 1100 1100	10 1001 1100	TERC4_0	0	0	0	0	1	498.801346 us
37037	10 1100 1100	10 1001 1100	TERC4_1	0	0	0	0	1	498.814814 us
37038	10 1100 1100	10 1001 1100	TERC4_0	0	0	0	0	1	498.828282 us
37039	10 1100 1100	10 1001 1100	TERC4_0	0	0	0	0	1	498.841750 us
37040	10 1100 1100	10 0110 0011	TERC4_1	0	0	0	0	1	498.855218 us
37041	10 1100 1100	10 1001 1100	TERC4_1	0	0	0	0	1	498.868686 us
37042	10 1100 1100	10 0110 0011	TERC4_0	0	0	0	0	1	498.882154 us
37043	10 1100 1100	10 0110 0011	TERC4_0	0	0	0	0	1	498.895622 us
37044	10 1100 1100	10 1001 1100	TERC4_1	0	0	0	0	1	498.909090 us
37045	10 1100 1100	10 1001 1100	TERC4_0	0	0	0	0	1	498.922558 us
37046	10 1100 1100	10 1001 1100	TERC4_0	0	0	0	0	1	498.936026 us
37047	10 1100 1100	10 1001 1100	TERC4_0	0	0	0	0	1	498.949494 us

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

Module front panel connectors



Supported HDMI CTS Version 1.4a Source Tests

Test	Name
Section 7.4 Source – Protocol	
7-16	Legal Codes
7-17	Basic Protocol
7-18	Extended Control Period
7-19	Packet Types
Section 7.5 Source – Video	
7-23	Pixel Encoding – RGB to RGB Sink
7-24	Pixel Encoding – YcbCr to YCbCr Sink
7-25	Video Format Timing
7-26	Pixel Repetition
7-27	AVI InfoFrame
Section 7.6 Source – Audio	
7-28	IEC 60958/IEC 61937
7-29	ACR
7-30	Audio Sample Packet Jitter
7-31	Audio InfoFrame
7-32	Audio Sample Packet Layout
Section 7.7 Source – Interoperability with DVI	
7-33	Interoperability with DVI
Section 7.8 Source – Advanced Features	
7-34	Deep Color
7-35	Gamut Metadata Transmission
7-36	High Bitrate Audio
7-37	One Bit Audio
7-38	3D Video Format Timing
7-40	Extended Colorimetry Transmission

Supported HDMI CTS Version 1.4a Sink Tests

Test	Name	U4998A HDMI PAG	E4887A TMDS Signal Generator	Quantum Data 882CA
Section 8.3 Sink – Electrical				
8-5	TMDS – Min/Max Diff Swing Tol.		▲	
8-6	TMDS – Intra-Pair Skew		▲	
8-7	TMDS – Jigger Tolerance		▲	
Section 8.4 Sink – Protocol				
8-15	Char. Synchronization		▲	
8-16	Accep. Of All Valid Packet Types	▲		
Section 8.5 Sink – Video				
8-17	Basic Format Support Req.			▲
8-18	HDMI Format Support Req.			▲
8-19	Pixel Encoding Requirements		▲	▲
8-20	Video Format Timing		▲	
Section 8.6 Sink – Audio				
8-21	Audio clock Regeneration	▲		
8-22	Audio Sample Packet Jitter		▲	
8-23	Audio Formats	▲		
Section 8.7 Sink – Interoperability with DVI				
8-24	Interoperability with DVI		▲	
Section 8.8 Sink – Advanced Features				
8-25	Deep Color	▲	▲	
8-29	3D Video Format Timing	▲		
8-30	4K x 2K Video Format Timing		▲	
8-31	AVI Info Frame supporting extended colorimetry, content type, selectable YCC Quantization Range	▲		

Note: For tests 8-19 and 8-25, all instruments indicated are needed

Supported video formats: Capture/Compliance

CEA Video ID code	Format	Field rate	Picture aspect ratio	24 bit	30 bit	36 bit	48 bit	3D		
								Frame Packing	Top-to-Bottom	Side-by-Side
1	640x480p	59.94 Hz/60 Hz	4:3	▲	▲	▲	▲	▲		
2	720x480p	59.94 Hz/60 Hz	4:3	▲	▲	▲	▲	▲		
3	720x480p	59.94 Hz/60 Hz	16:9	▲	▲	▲	▲	▲		
4	1280x720p	59.94 Hz/60 Hz	16:9	▲	▲	▲	▲	▲	▲	▲
5	1920x1080i	59.94 Hz/60 Hz	16:9	▲	▲	▲	▲	▲	▲	▲
6	720(1440)x480i	59.94 Hz/60 Hz	4:3	▲	▲	▲	▲	▲		
7	720(1440)x480i	59.94 Hz/60 Hz	16:9	▲	▲	▲	▲	▲		
8	720(1440)x240p	59.94 Hz/60 Hz	4:3	▲	▲	▲	▲	▲		
9	720(1440)x240p	59.94 Hz/60 Hz	16:9	▲	▲	▲	▲	▲		
10	2880x480i	59.94 Hz/60 Hz	4:3	▲	▲	▲	▲	▲		
11	2880x480i	59.94 Hz/60 Hz	16:9	▲	▲	▲	▲	▲		
12	2880x240p	59.94 Hz/60 Hz	4:3	▲	▲	▲	▲	▲		
13	2880x240p	59.94 Hz/60 Hz	16:9	▲	▲	▲	▲	▲		
14	1440x480p	59.94 Hz/60 Hz	4:3	▲	▲	▲	▲	▲		
15	1440x480p	59.94 Hz/60 Hz	16:9	▲	▲	▲	▲	▲		
16	1920x1080p	59.94 Hz/60 Hz	16:9	▲	▲	▲	▲	▲	▲	
17	720x576p	50 Hz	4:3	▲	▲	▲	▲	▲		
18	720x576p	50 Hz	16:9	▲	▲	▲	▲	▲		
19	1280x720p	50 Hz	16:9	▲	▲	▲	▲	▲	▲	▲
20	1920x1080i	50 Hz	16:9	▲	▲	▲	▲	▲		▲
21	720(1440)x576i	50 Hz	4:3	▲	▲	▲	▲	▲		
22	720(1440)x576i	50 Hz	16:9	▲	▲	▲	▲	▲		
23	720(1440)x288p	50 Hz	4:3	▲	▲	▲	▲	▲		
24	720(1440)x288p	50 Hz	16:9	▲	▲	▲	▲	▲		
25	2880x576i	50 Hz	4:3	▲	▲	▲	▲	▲		
26	2880x576i	50 Hz	16:9	▲	▲	▲	▲	▲		
27	2880x288p	50 Hz	4:3	▲	▲	▲	▲	▲		
28	2880x288p	50 Hz	16:9	▲	▲	▲	▲	▲		
29	1440x576p	50 Hz	4:3	▲	▲	▲	▲	▲		
30	1440x576p	50 Hz	16:9	▲	▲	▲	▲	▲		
31	1920x1080p	50 Hz	16:9	▲	▲	▲	▲	▲	▲	
32	1920x1080p	23.97 Hz/24 Hz	16:9	▲	▲	▲	▲	▲	▲	▲
33	1920x1080p	25 Hz	16:9	▲	▲	▲	▲	▲		
34	1920x1080p	29.97 Hz/30 Hz	16:9	▲	▲	▲	▲	▲	▲	
35	2880x480p	59.94 Hz/60 Hz	4:3	▲	▲	▲	▲	▲		
36	2880x480p	59.94 Hz/60 Hz	16:9	▲	▲	▲	▲	▲		
37	2880x576p	50 Hz	4:3	▲	▲	▲	▲	▲		
38	2880x576p	50 Hz	16:9	▲	▲	▲	▲	▲		
39	1920x1080i	50 Hz	16:9	▲	▲	▲	▲	▲		
40	1920x1080i	100 Hz	16:9	▲	▲	▲	▲	▲		
41	1280x720p	100 Hz	16:9	▲	▲	▲	▲	▲		
42	720x576p	100 Hz	4:3	▲	▲	▲	▲	▲		
43	720x576p	100 Hz	16:9	▲	▲	▲	▲	▲		
44	720(1440)x756i	100 Hz	4:3	▲	▲	▲	▲	▲		
45	720(1440)x756i	100 Hz	16:9	▲	▲	▲	▲	▲		

CEA Video ID code	Format	Field rate	Picture aspect ratio	24 bit	30 bit	36 bit	48 bit	3D		
								Frame Packing	Top-to-Bottom	Side-by-Side
46	1920x1080i	119.88 Hz/120 Hz	16:9	▲	▲	▲	▲	▲		
47	1280x720p	119.88 Hz/120 Hz	16:9	▲	▲	▲	▲	▲		
48	720x480p	119.88 Hz/120 Hz	4:3	▲	▲	▲	▲	▲		
49	720x480p	119.88 Hz/120 Hz	16:9	▲	▲	▲	▲	▲		
50	720(1440)x480i	119.88 Hz/120 Hz	4:3	▲	▲	▲	▲	▲		
51	720(1440)x480i	119.88 Hz/120 Hz	16:9	▲	▲	▲	▲	▲		
52	720x576p	200 Hz	4:3	▲	▲	▲	▲	▲		
53	720x576p	200 Hz	16:9	▲	▲	▲	▲	▲		
54	720(1440)x576i	200 Hz	4:3	▲	▲	▲	▲	▲		
55	720(1440)x576i	200 Hz	16:9	▲	▲	▲	▲	▲		
56	720x480p	239.76 Hz/240 Hz	4:3	▲	▲	▲	▲	▲		
57	720x480p	239.76 Hz/240 Hz	16:9	▲	▲	▲	▲	▲		
58	720(1440)x480i	239.76 Hz/240 Hz	4:3	▲	▲	▲	▲	▲		
59	720(1440)x480i	239.76 Hz/240 Hz	16:9	▲	▲	▲	▲	▲		
60	1280x720p	24 Hz	16:9	▲	▲	▲	▲	▲		
61	1280x720p	25 Hz	16:9	▲	▲	▲	▲	▲		
62	1280x720p	29.7 Hz/30 Hz	16:9	▲	▲	▲	▲	▲		
63	1920x1080p	120 Hz	16:9	▲	▲	▲	▲	▲		
64	1920x1080p	100 Hz	16:9	▲	▲	▲	▲	▲		
H01	3840x2160p	29.97 Hz/120 Hz	16:9	▲	▲	▲	▲	▲		
H02	3840x2160p	25 Hz	16:9	▲	▲	▲	▲	▲		
H03	3840x2160p	23.97 Hz/24 Hz	16:9	▲	▲	▲	▲	▲		
H04	4096x2160p	24 Hz	16:9	▲	▲	▲	▲	▲		

Supported video formats: Generation/Compliance

CEA Video ID code	Format	Field rate	Picture aspect ratio	24 bit	30 bit	36 bit	48 bit	3D		
								Frame Packing	Top and Bottom	Side by Side
1	640x480p	59.94 Hz/60 Hz	4:3	▲	▲	▲	T			
2	720x480p	59.94 Hz/60 Hz	4:3	▲	▲	▲	T			
3	720x480p	59.94 Hz/60 Hz	16:9	▲	▲	▲	T			
4	1280x720p	59.94 Hz/60 Hz	16:9	▲	▲	▲	T	▲	▲	▲
5	1920x1080i	59.94 Hz/60 Hz	16:9	▲	▲	▲	T	▲	▲	▲
6	720(1440)x480i	59.94 Hz/60 Hz	4:3	▲	▲	▲	T			
7	720(1440)x480i	59.94 Hz/60 Hz	16:9	▲	▲	▲	T			
8	720(1440)x240p	59.94 Hz/60 Hz	4:3	▲	B	B	T			
9	720(1440)x240p	59.94 Hz/60 Hz	16:9	▲	B	B	T			
10	2880x480i	59.94 Hz/60 Hz	4:3	▲	B	B	T			
11	2880x480i	59.94 Hz/60 Hz	16:9	▲	B	B	T			
12	2880x240p	59.94 Hz/60 Hz	4:3	▲	B	B	T			
13	2880x240p	59.94 Hz/60 Hz	16:9	▲	B	B	T			
14	1440x480p	59.94 Hz/60 Hz	4:3	▲	▲	▲	T			
15	1440x480p	59.94 Hz/60 Hz	16:9	▲	▲	▲	T			
16	1920x1080p	59.94 Hz/60 Hz	16:9	▲	T				▲	
17	720x576p	50 Hz	4:3	▲	▲	▲	T			
18	720x576p	50 Hz	16:9	▲	▲	▲	T			
19	1280x720p	50 Hz	16:9	▲	▲	▲	T	▲	▲	▲
20	1920x1080i	50 Hz	16:9	▲	▲	▲	T	▲		▲
21	720(1440)x576i	50 Hz	4:3	▲	▲	▲	T			
22	720(1440)x576i	50 Hz	16:9	▲	▲	▲	T			
23	720(1440)x288p	50 Hz	4:3	B	T	T	T			
24	720(1440)x288p	50 Hz	16:9	B	T	T	T			
25	2880x576i	50 Hz	4:3	▲	T	T	T			
26	2880x576i	50 Hz	16:9	▲	T	T	T			
27	2880x288p	50 Hz	4:3	▲	T	T	T			
28	2880x288p	50 Hz	16:9	▲	T	T	T			
29	1440x576p	50 Hz	4:3	▲	▲	▲	T			
30	1440x576p	50 Hz	16:9	▲	▲	▲	T			
31	1920x1080p	50 Hz	16:9	▲	▲	▲	T		▲	
32	1920x1080p	23.97 Hz/24 Hz	16:9	▲	▲	▲	T	▲	▲	▲
33	1920x1080p	25 Hz	16:9	▲	T	T	T			
34	1920x1080p	29.97 Hz/30 Hz	16:9	▲	T	T	T	▲	▲	
35	2880x480p	59.94 Hz/60 Hz	4:3	▲	▲	▲	T			
36	2880x480p	59.94 Hz/60 Hz	16:9	▲	▲	▲	T			
37	2880x576p	50 Hz	4:3	▲	▲	▲	T			
38	2880x576p	50 Hz	16:9	▲	▲	▲	T			
39	1920x1080i	50 Hz	16:9	B	T	T	T			
40	1920x1080i	100 Hz	16:9	T	T					
41	1280x720p	100 Hz	16:9	T						
42	720x576p	100 Hz	4:3	B	T	T	T			
43	720x576p	100 Hz	16:9	B	T	T	T			
44	720(1440)x756i	100 Hz	4:3	B	T	T	T			
45	720(1440)x756i	100 Hz	16:9	B	T	T	T			

CEA Video ID code	Format	Field rate	Picture aspect ratio	24 bit	30 bit	36 bit	48 bit	3D		
								Frame Packing	Top and Bottom	Side by Side
46	1920x1080i	119.88 Hz/120 Hz	16:9	T						
47	1280x720p	119.88 Hz/120 Hz	16:9							
48	720x480p	119.88 Hz/120 Hz	4:3	B	T					
49	720x480p	119.88 Hz/120 Hz	16:9	B	T					
50	720(1440)x480i	119.88 Hz/120 Hz	4:3	B	T	T	T			
51	720(1440)x480i	119.88 Hz/120 Hz	16:9	B	T	T	T			
52	720x576p	200 Hz	4:3	B	T	T	T			
53	720x576p	200 Hz	16:9	B	T	T	T			
54	720(1440)x576i	200 Hz	4:3	B	T	T	T			
55	720(1440)x576i	200 Hz	16:9	B	T	T	T			
56	720x480p	239.76 Hz/240 Hz	4:3	B			T			
57	720x480p	239.76 Hz/240 Hz	16:9	B			T			
58	720(1440)x480i	239.76 Hz/240 Hz	4:3	B			T			
59	720(1440)x480i	239.76 Hz/240 Hz	16:9	B			T			
60	1280x720p	24 Hz		▲						
61	1280x720p	25 Hz		▲						
62	1280x720p	29.7 Hz/30 Hz		▲						
63	1920x1080p	120 Hz		T						
64	1920x1080p	100 Hz		T						
H01	3840x2160p	29.97 Hz/120 Hz	16:9							
H02	3840x2160p	25 Hz	16:9							
H03	3840x2160p	23.97 Hz/24 Hz	16:9							
H04	4096x2160p	24 Hz	16:9							

T: High resolution TMDS signal converter E4887A Option 007

B: Pattern not pre-installed, requires Option BIT-HDMI-FG-PAG

General system characteristics and requirements

Host PC system requirements	
Hardware	1 GHz 32-bit (x86), 1 GHz 64-bit (x64) processor speed (no support for Itanium 64) 1 GB minimum available memory 1.5 GB available hard disk space Support for DirectX 9 graphics with 128 MB graphics memory recommended, (Super VGA graphics is supported) Microsoft Internet Explorer 7 or greater PCI ExpressCard slot (Laptop) PCI Express slot (Desktop)
Operating system	Microsoft Windows® XP, Service Pack 3 or later (32-bit), Microsoft Windows® 7 (32-bit and 64-bit)
U4998A General characteristics	
Power requirements	
Maximum data rate supported	3.4 Gbps
Memory depth	4 GB
U4998A Module Connectors	
HMDI (input and output)	Type A receptacle
Auxiliary clock in and clock out	MCX connector
Trig In and Trig Out	BNC

Environmental and Physical

Operating environment	
Temperature (nom)	0° C to +40° C
Humidity (nom)	0 to 80% relative humidity
Altitude	0 to 4600m (15,000 ft)
Vibration	Up to 0.2 g rms (5 to 500 Hz)
Shock	2mS @ 100g

Non-operating environment	
Temperature (nom)	-40° C to +70° C
Humidity (nom)	0° C to 90% relative humidity at 65° C
Altitude	0 to 4600m (15,000ft)
Vibration	Up to 2.41 g rms (5 to 200Hz in shipping carton)
Shock	2mS @ 100g, 20mS @30g

Weight and Dimensions	
Weight	1.9 kG
Dimensions	14-in W x 12.25-in D x 1.375-in H

Definitions for specifications

Specification (spec): Represents warranted performance of a calibrated instrument that has been stored for a minimum of 2 hours within the operating temperature range of 0 to 40° C, unless otherwise stated, and after a 45 minute warm-up period. The specifications include measurement uncertainty. Data represented in this document are specifications unless otherwise noted.

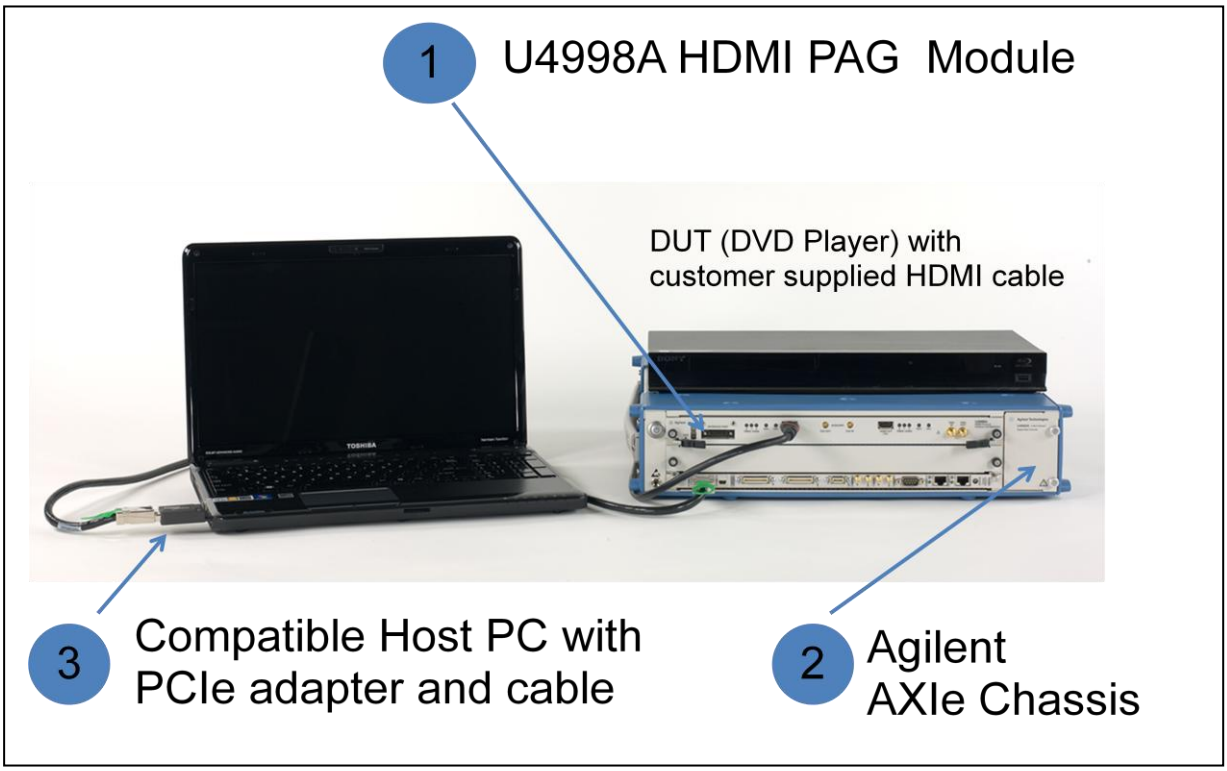
Typical (typ): Represents characteristic performance, which 80% of the instruments manufactured will meet. This data is not warranted, does not include measurement uncertainty, and is valid only at room temperature (approximately 25° C).

Nominal (nom): The expected mean or average performance, or an attribute whose performance is by design, such as the 50 Ω connector. This data is not warranted and is measured at room temperature (approximately 25° C).

Measured (meas): An attribute measured during the design phase for purposes of communicating expected performance, such as amplitude drift vs time. This data is not warranted and is measured at room temperature

CONFIGURATION

Configure an Agilent HDMI PAG solution as follows with quantity 1 for each component:



Step 1. **Order the U4998A module and desired U4998U upgrade option(s)**		**Model**	**Option**	**Description**
		U4998A	Included standard HDM, H14 CMP GEN HDMI 1.4a PAG	 HDMI 1.4a support Capture/Compliance mode Generate/Compliance mode 4 GB Memory
		U4998U	PSV	Passive Monitoring Mode

Step 2. **Order a Modular Chassis**		**Modular Chassis**		**U4002A** **2–slot chassis**	**M9502A** **2–slot chassis**	**M9505A** **5–slot chassis**
Step 3. **Order the adapter and cable for your Host PC type and chassis selection**		**Laptop**	PCIe ExpressCard Adapter	U4002A-EXP	M9045A	M9045A
			PCIe Cable	2.0m: U4002A-2MC 5.0m: U4002A-5MC	2.0m: Y1200A	2.0m: Y1200A
		Desktop	PCIe Desktop PC Adapter	U4002A-SLT	M9047A	M9047A
			PCIe Cable	2.0m: U4002A-2MC 5.0m: U4002A-5MC	Y1202A	Y1202A

System Component Compatibility

Module/Chassis Compatibility

The U4998A HDMI PAG module is compatible with the following Agilent AMP and AXIe Chassis

- U4002A 2-slot AMP modular chassis
- M9502A 2-slot AXIe modular chassis
- M9505A 5-slot AXIe modular chassis

Application Software/Module Compatibility

The application software for the U4998A HDMI PAG (version 5.00 or above) also controls the following AXIe-based modules.

- U4301A Analyzer module for PCIe 8 Gpbs
- U4154A Logic analyzer, 136-channel, 12.5 GHz timing zoom, 2.5 GHz state, 2 Mb depth

Any other AXIe modules in the chassis will not be recognized by the application software. The software is downloadable from http://www.agilent.com/find/...

Automation Software Compatibility

Automate your HDMI testing and remotely control the U4998A using COM commands. The COM Server is embedded in the application software.

HDMI Cable to DUT

For best results, Agilent recommends using a category 2 HDMI cable to connect the U4998A HDMI PAG to the DUT (device under test).

ORDERING

AXIe Measurement Module

Model	Description
U4998A	HDMI 1.4 Protocol/Audio/Video Analyzer and Generator

Upgrades for U4998A

Model	Description
U4998U-PSV	Passive Monitoring (Pass Through/Mirror)

Optional Software

Model	Description
N5998U-DBG	Software license for debug exporter

AXIe Modular Chassis

Model	Description
U4002A	Digital Test Console 2-slot Chassis
M9502A	AXIe Chassis: 2-slot with Integrated System Module
M9505A	AXIe Chassis: 5-slot with Integrated System Module

PCIe Adapters/Cables and Chassis Accessories

Model	Description
U4002A-EXP	PCI Express cable to express card adapter for laptop connections
U4002A-SLT	PCI Express cable to slot adapter for desktop connections
U4002A-2MC	PCIe cable (2.0m)
U4002A-5MC	PCIe cable (5.0m)
U4002A-050	Chassis-to-chassis cable (50cm)
U4002A-300	Chassis-to-chassis cable (3m)
U4002A-SFT	Soft carrying bag for 2-slot chassis
U4002A-PCH	Accessories pouch kit for 2-slot chassis
M9045A	PCIe ExpressCard adapter: Gen1
Y1200A	PCIe cable: x4 to x8, 2.0m (used with M9045A)
M9047A	PCIe desktop PC adapter, Gen2, x8
Y1202A	PCIe cable: x8, 2.0m (used with M9047A)
Y1225A	Rack mount kit for M9502A or U4002A
Y1226A	Rack mount kit for M9505A

Related Products

Model	Description
U4301A	Analyzer module for PCIe 8Gbps
U4154A	Logic Analyzer, 136-channel, 12.5 GHz timing zoom, 2.5 GHz state, 2 Mb depth

WARRANTY AND SERVICES

Advantage services: warranty and services

Agilent Advantage Services is committed to your success throughout your equipment's lifetime.

Warranty	Description
R1280A R-51B-001-C	Return to Agilent Warranty – 1 year (Standard)
R1280A R-51B-001-3C	Return to Agilent Warranty – 3 years
R1280A R-51B-001-5C	Return to Agilent Warranty – 5 years

Services	Description
PS-S10	Remote scheduled productivity assistance.
PS-S20	Startup assistance
PS-X10	Custom services to be qualified by an Agilent technical consultant

RELATED AGILENT LITERATURE

Publication Title	Publication Number
Agilent Test Solutions for HDMI Brochure	5989-7169EN
Agilent E4887A HDMI TMDS Signal Generator Platform Data Sheet	5989-5537EN
Agilent Technologies N5990A Test Automation Software Platform Data Sheet	5989-5483EN
Agilent M9502A and M9505A 2 and 5-slot AXIe Chassis Data Sheet	5990-6584EN
Agilent U4154A 4 Gb/s AXIe-based Logic Analyzer Module Data Sheet	5990-7513EN
Agilent Digital Test Console PCI Express® 3.0 Data Sheet	5990-5018EN